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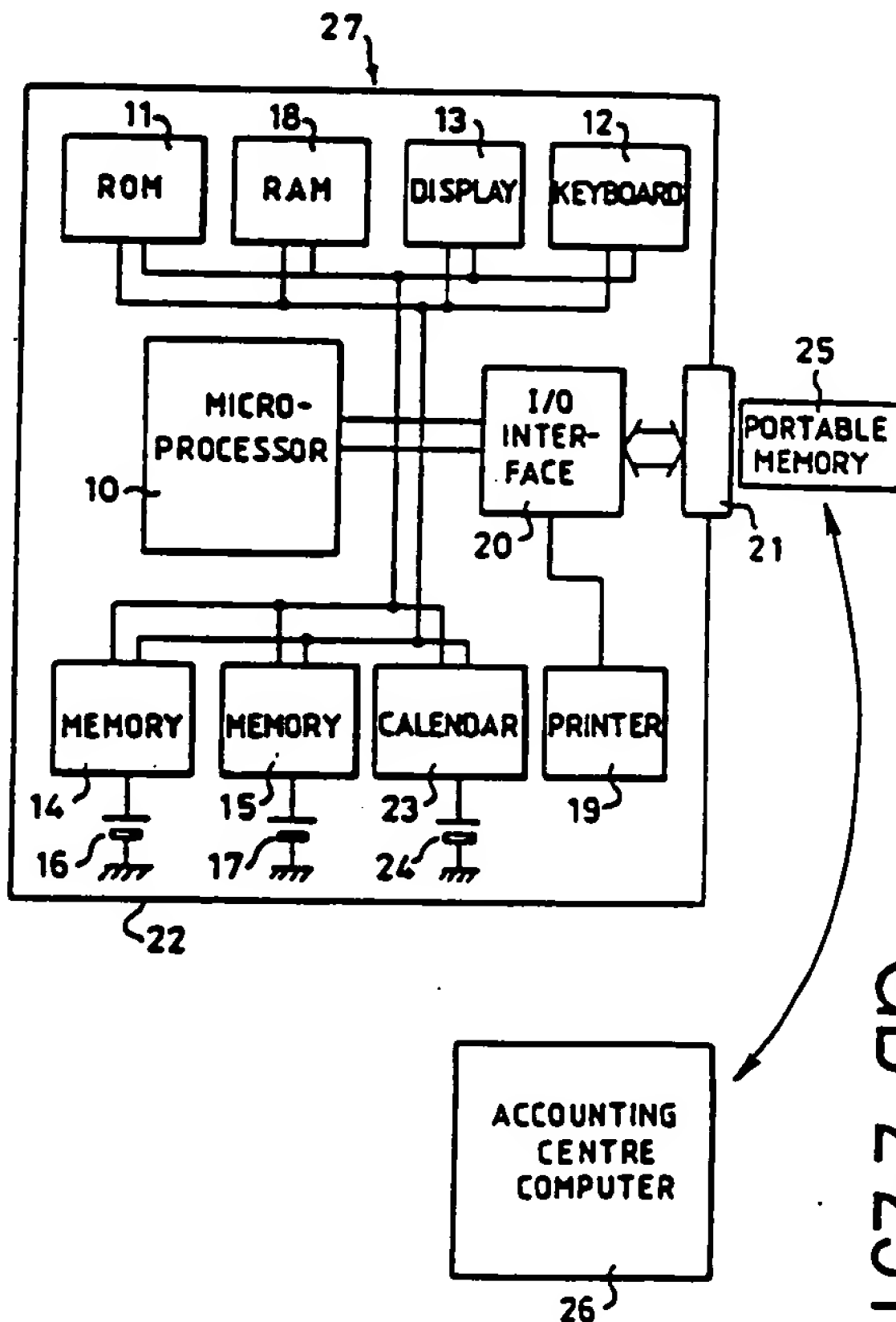
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(54) Unlocking operation of a "locked-out" post-payment postage meter

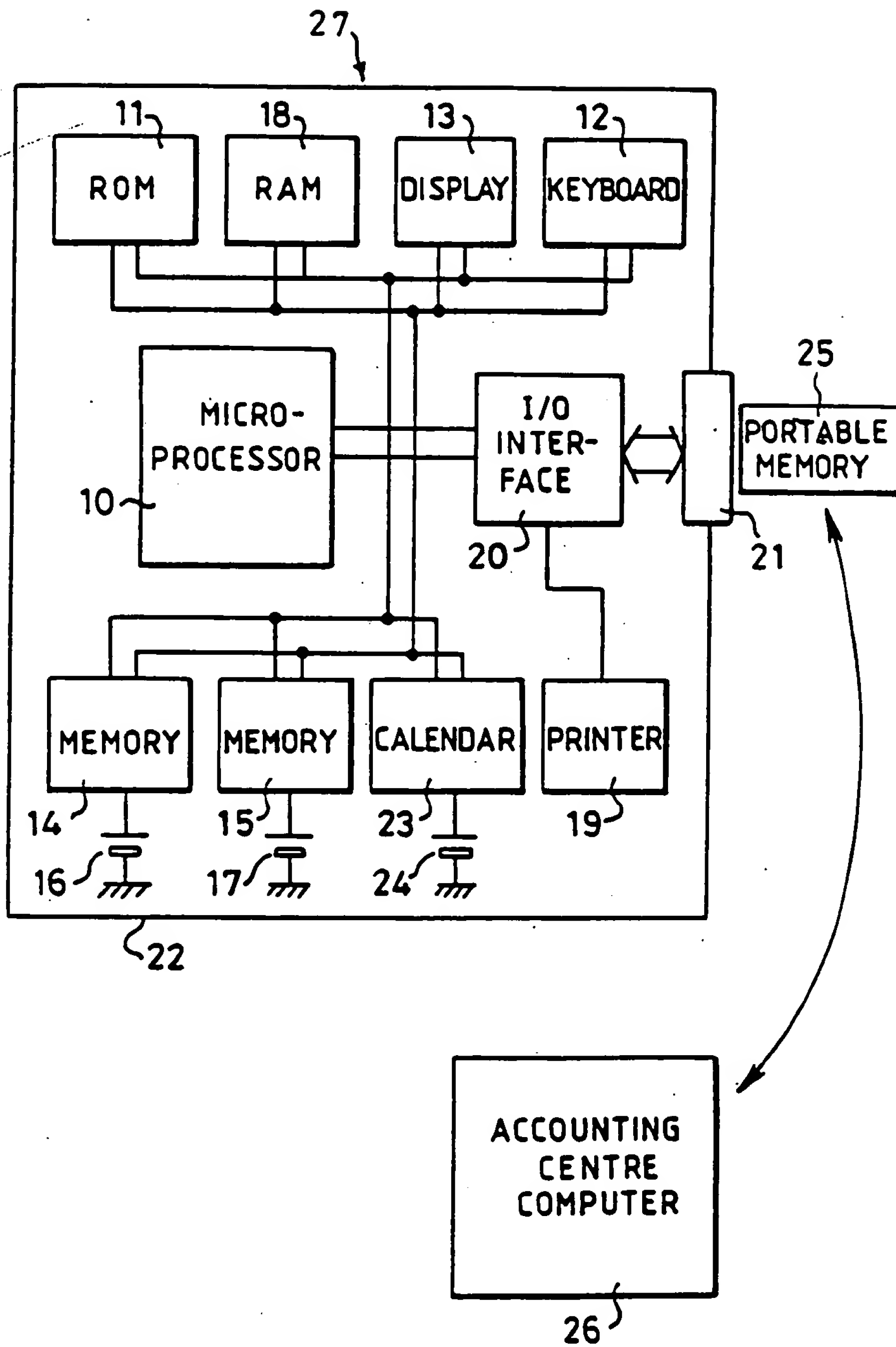
(57) A post-payment postage meter, of a kind in which operation is inhibited after the exhaustion of a measurable parameter (e.g. in response to an internal calendar), is reactivated by the input of a pseudo-random number generated by a remote accounting centre only if the number matches a pseudo-random number generated within the meter itself.

In a preferred form, a portable memory device is shuttled (e.g. by post) between the meter and the accounting centre. At the accounting centre the latest accounting details from the meter are read and justified w.r.t. the holders account before the random number is generated and stored to the portable memory. At the postage meter the random number is compared against the internally generated number, and if justified, the operation of the meter is enabled and the latest accounting data is stored to the memory device for conveyance to the accounting centre.

It is stated that the portable memory device can be replaced by telephonic transmission of data between meter and account centre.



GB 2 251 210



POSTAGE METER SYSTEM

This invention relates to postage meters used for franking mail items.

5 While some postal authorities pre-payment in respect of postage value to be used in franking items for delivery by the postal authority, other postal authorities use a post payment procedure in which payment is made in respect of past use of a postage meter for franking items. Security
10 procedures are required in order to ensure that correct payment is made by the user in respect of the value of postage which has been used in franking mail items and to control use of the postage meter in the event that a default is made in respect of any payment. Generally
15 users send a statement each month to the postal authority setting out the usage of the postage meter and payment is made in accordance with the statement. The statement is prepared manually by operating the postage meter to display the account data stored in account data registers
20 and the user transcribes the displayed values onto a statement sheet or card. Inaccuracies in transcription may occur. Periodically a representative of the postal authority makes a visit to examine the postage meter and to check that the statements represent an accurate record
25 of usage of the meter.

According to one aspect of the invention a postage meter system includes a plurality of postage meters operable in a post payment mode wherein the meters each include means
30 which operate to inhibit use of the meter to carry out franking operations at predetermined intervals; means to generate a series of pseudo-random numbers unique to said meter; means at a remote centre to generate a plurality of series of pseudo-random numbers corresponding to the
35 series generated by the meters; a portable memory device loaded with a current pseudo-random number corresponding to the pseudo-random number of a meter which has been

inhibited from use to carry out franking operations; means to couple the portable memory device to said inhibited meter and to compare the pseudo-random number carried by the portable memory device with the pseudo-random number generated by the inhibited meter and if the comparison is successful to terminate the inhibition of use for franking operations and load data stored in registers of the meter into the portable memory device.

10 According to another aspect of the invention a method of controlling use of postage meters operating in a post payment mode includes the steps of generating a pseudo-random number at each meter; generating pseudo-random numbers at a central computer which correspond to those generated at each meter; the pseudo-random numbers being unique to each meter respectively; providing each meter with means operative to inhibit the meter from carrying out franking operations when a variable is equal to any one of a plurality of predetermined values; conveying the pseudo-random number corresponding to an inhibited meter to the inhibited meter; comparing the conveyed pseudo-random number with the pseudo-random number generated at the meter and if the comparison is successful outputting accounting data values stored in registers in the meter, conveying said accounting data values to the central computer, terminating the inhibition of the meter and incrementing the pseudo-random number generated at the meter.

30 According to a further aspect of the invention a method of controlling use of a postage meter operating in a post payment mode comprises the steps of causing the meter to be inhibited from carrying out franking operations at each of a series of times predetermined by the meter; upon the occurrence of inhibition of the meter utilising a secure electronic key to effect transfer of data relating to use of the meter prior to said occurrence of inhibition from

the meter to an accounting centre and to terminate said inhibition until occurrence of inhibition at the next predetermined time.

- 5 An embodiment of the invention will now be described by way of example with reference to the drawing which is a block circuit diagram of a postage meter system.

Referring to the drawing, a postage meter comprises an
10 electronic microprocessor 10 operable under program routines stored in a read only memory (ROM) 11 to carry out franking and control operations of the postage meter. A keyboard 12 is provided to enable the input of command signals and data signals, such as a required value of
15 franking, to the microprocessor 10. A display device 13 echoes the input on the keyboard and also displays other information to assist a user in using the postage meter. Accounting data relating to usage of the postage meter in carrying out franking operations is stored in memories 14,
20 15. The memories may be non-volatile devices or may be powered by batteries 16, 17 so that the account data is retained in the memories when power to the postage meter is terminated. A random access memory 18 is provided as a working store for the microprocessor 10. A printing
25 device 19 is controlled by the microprocessor to print franking impressions on mail items. The printing device may comprise a mechanical printer such as drum printer in which fixed portions of the franking impression are printed by die plates carried on the drum and in which
30 variable portions comprising the date and franking value are printed by settable printing wheels carried by the drum. The printing wheels may be set by electric motors acting through mechanical linkages and energisation of the motors is controlled by signals output from the
35 microprocessor 10 in dependence upon the required value of franking input on the keyboard. Alternatively the printing device may be a digital printer such a thermal

ink transfer printer having a line of thermal printing elements which are energised selectively by print data signals output by the microprocessor 10. The thermal printing elements are energised selectively in a plurality of print cycles to build up the franking impression line by line as the mail item is fed past the printing elements.

The memories 14, 15 have storage locations arranged to provide a number of registers for storing accounting data. A tote register stores an accumulated value of postage used in franking mail items. An items register stores a count of the number of items franked and a high items register stores a count of the number of items franked with a value in excess of a predetermined value.

When a user operates the keyboard to command the postage meter to frank a mail item with a desired value of franking, the microprocessor receives input from the keyboard and initiates a franking program routine. In this routine the tote value in the ascending tote register is incremented by an amount corresponding to the value of franking desired and the items count in the items register is incremented by unity. If the desired franking value is in excess of the predetermined value, the high items count in the high items register is incremented by unity.

Operation of the meter for carrying out franking of mail items is inhibited periodically in a predetermined manner to ensure that the user conveys accounting data relating to the use of the meter to an accounting centre to enable the accounting centre to issue invoices in respect of the postage value used by the meter. Only when this action has been carried out by the user is the meter unlocked to permit franking operations to be resumed.

Inhibition of operation of the meter may be effected by

means of an electronic calendar 23 powered by a long life battery 24, for example a lithium battery having an operational life of the order of ten years, provided in the postage meter. The calendar is set at the time of manufacture or supply of the meter and hence provides a time reference during use of the meter. The calendar 23 is arranged to provide a signal to the microprocessor 10 at predetermined times, for example on a predetermined day each month, which inhibits operation of the microprocessor under the franking routine. Accordingly when the microprocessor is inhibited, the postage meter cannot be used for franking until it has been reset. Instead of inhibiting the microprocessor from operation under the franking routine in response to the calendar indicating the occurrence of a predetermined time, the microprocessor may be inhibited in response to the accumulated value registered in the tote register being equal to any one of a number of predetermined values or of the items count in the items register being equal to any one of a number of predetermined values. The predetermined values of the accumulated tote value or of the items count may be preset upon supply of the postage meter so as to provide inhibition of operation of the microprocessor under the franking routine after equal increments of use occurring approximately at desired intervals of time in accordance with an assessment of the expected usage of the postage meter. In order to initiate the inhibition of the microprocessor, the franking program routine includes program steps in which the microprocessor accesses the calendar or the tote or items registers. If the calendar is provided and the microprocessor detects a signal having a first value, the program routine enters a lock-out of branch of the program whereas if the signal is detected as having a second value the microprocessor is enabled to continue with the franking routine. If inhibition of the microprocessor is dependent upon the tote value or items count being equal to a predetermined one of a plurality of

values, the franking routine includes program steps in which the microprocessor reads the stored tote value or items count and determines if the current value is equal to one of the predetermined values. If it is equal, the
 5 program routine enters a lock-out branch of the program.

An input/output interface 20 is connected to the microprocessor 10 for the input and output of signals to and from the microprocessor via a connector 21 in the wall
 10 of a secure housing 22 of the postage meter. The interface 20 includes protection circuits to prevent the application of excessive voltages to the circuits used for carrying out accounting and control functions in the meter.

15 In order to resume use of the postage meter for franking operations, the postage meter must be reset. This is conveniently achieved by the use of a portable memory device 25 which can be coupled to the connector 21.
 20 The postage meter and a remote accounting or resetting centre 26 each include means to generate a series of pseudo-random numbers, the pseudo-random number generated by the meter corresponding to that generated by the remote centre. Both generators operate in the same manner so
 25 that when the generators are stepped on to increment the pseudo-random number to the next in the series, the pseudo-random numbers although different from the previous pseudo-random number continue to correspond to one another. The pseudo-random number generated by any one of
 30 the meters is unique to that meter. The portable memory device is loaded with the current pseudo random number which corresponds to the pseudo random number in both the postage meter and the remote centre. When the memory is connected to the meter, the microprocessor is operated
 35 under a reset program routine in which the microprocessor reads the pseudo-random number from the memory device 25 and checks that it corresponds to the pseudo-random number

generated in the meter. If the comparison is successful, the microprocessor continues in the reset routine by reading the values stored in the registers and writing these values to the portable memory device. In addition a
5 meter identification is written into the portable memory device. The reset routine further includes steps which enable the microprocessor to un-lock the inhibition on the franking routine thereby enabling the postage meter to be used for franking operations again. The pseudo-random
10 number generator is incremented to generate the next pseudo-random number to be used when the meter is next locked-out. The portable memory device is sent by mail to the resetting centre where it is connected to a computer for retrieval of the register value data stored therein.
15 The computer reads the meter identification and checks the pseudo-random number carried by the device with the pseudo-random number corresponding to that specific meter generated by the computer. If the comparison check is successful the register data is retrieved from the
20 portable device and input to accounting records maintained by the computer for meters controlled thereby. The pseudo-random number generated in the computer is incremented and written to the storage device. The storage device now contains the same next pseudo-random
25 number as the postage meter and hence upon return to the user of the meter is available for resetting the meter when next required. The resetting centre utilises the register data entered into the meter records to issue an invoice in respect of the postage value used since the
30 issue of a previous invoice. The use of the portable memory device dispenses with any requirement for manual transcription of the register data and hence assures that the register data input to the computer record at the remote centre is accurate. The convenience to both the
35 user and the resetting centre of using a portable memory device to read and convey register data from the meter to the remote centre enable the intervals of time between

which the meter is required to be reset to be chosen such that the resetting procedure is not an inconvenience to the user and yet sufficiently short that any default in payment is not unduly large for the postal authority. It will be appreciated that if the user makes a default in payment, the meter will lock-out and cannot be used again until the remote centre returns a portable memory device carrying the pseudo-random number corresponding to that generated by the meter.

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In order to provide security for the register data conveyed by the portable memory device, the register data and the pseudo-random number may be encrypted before writing to the device and are then decrypted when the data or pseudo-random number is read from the device.

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Instead of utilising a portable memory device for conveying the pseudo-random number and the register data, this information may be transmitted over a telephone network connected by modem to the connected 21 of the postage meter.

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CLAIMS

1. A postage meter system including a plurality of postage meters operable in a post payment mode wherein the meters each include means which operate to inhibit use of the meter to carry out franking operations at predetermined intervals; means to generate a series of pseudo-random numbers unique to said meter; means at a remote centre to generate a plurality of series of pseudo-random numbers corresponding to the series generated by the meters; a portable memory device loaded with a current pseudo-random number corresponding to the pseudo-random number of a meter which has been inhibited from use to carry out franking operations; means to couple the portable memory device to said inhibited meter and to compare the pseudo-random number carried by the portable memory device with the pseudo-random number generated by the inhibited meter and if the comparison is successful to terminate the inhibition of use for franking operations and load data stored in registers of the meter into the portable memory device.

2. A postage meter system as claimed in claim 1 wherein upon termination of inhibition of the meter, the meter operates to increment the pseudo-random number generated in the meter to the next pseudo-random number in the series.

3. A postage meter system as claimed in claim 2 including a central computer to receive the portable memory device from the meter and to compare the pseudo-random number carried by the portable memory device with a pseudo-random number generated by the computer and if the comparison is successful to retrieve the register data from the portable memory device and to load the portable memory device with the next pseudo-random number in the series.

4. A postage meter system as claimed in any preceding

claim wherein the means operative to inhibit operation of the meters for franking operations comprises a calendar in each meter effective to provide an inhibition signal at predetermined intervals.

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5. A postage meter system as claimed in any one of claims 1 to 3 wherein each meter includes at least one register to store accounting data relating to usage of the meter and wherein the means operative to inhibit operation of the meters for franking operations includes means responsive to said accounting data having any one of a plurality of values to inhibit operation of the meter.

6. A method of controlling use of postage meters operating in a post payment mode including the steps of generating a pseudo-random number at each meter; generating pseudo-random numbers at a central computer which correspond to those generated at each meter; the pseudo-random numbers being unique to each meter respectively; providing each meter with means operative to inhibit the meter from carrying out franking operations when a variable is equal to any one of a plurality of predetermined values; conveying the pseudo-random number corresponding to an inhibited meter to the inhibited meter; comparing the conveyed pseudo-random number with the pseudo-random number generated at the meter and if the comparison is successful outputting accounting data values stored in registers in the meter, conveying said accounting data values to the central computer, terminating the inhibition of the meter and incrementing the pseudo-random number generated at the meter.

7. A method of controlling use of a postage meter operating in a post payment mode comprising the steps of causing the meter to be inhibited from carrying out franking operations at each of a series of times predetermined by the meter; upon the occurrence of

inhibition of the meter utilising a secure electronic key to effect transfer of data relating to use of the meter prior to said occurrence of inhibition from the meter to an accounting centre and to terminate said inhibition
5 until occurrence of inhibition at the next predetermined time.

8. A franking meter system constructed and arranged to operate substantially as hereinbefore described with
10 reference to the drawing.

9. A method of controlling use of franking meters substantially as hereinbefore described with reference to the drawing.

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Patents Act 1977

Examiner's report to the Comptroller under
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(i) UK CI (Edition K) B6C: CVAA, CVSA, CVSC, CVSD, CVSG

(ii) Int. CI (Edition S) G07B

Search Examiner

J Straker

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE WPI

Date of Search

19.3.91

Documents considered relevant following a search in respect of claims

1-9

Category (see v r)	Identity of document and relevant passages	Relevant to claim(s)
X, E	GB 2233937 (PITNEY BOWES)	1, 6, 7
X	GB 2215670 (PITNEY BOWES)	1, 6, 7
X	GB 2173738 (RONEO)	1, 6, 7
X	GB 2074942 (SIMJIAN)	1, 6, 7
X	WO 88/01818 (WRIGHT)	1, 6, 7
X	EP 0388840 (ALCATEL)	1, 6, 7

Category	Identity of document and relevant passages	Relevant to claim(s)

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